

CLAIMS

1. An inspection system for inspecting deposits printed on workpieces through a printing screen, the system comprising:
a camera unit movable relative to a printing screen, where comprising a body including a plurality of apertures, and a workpiece on which deposits are printed through the apertures of the printing screen; and a control unit operable to control the camera unit such as to capture images of at least one pair of corresponding regions of the printing screen and the workpiece, and process the images to determine, for each of a plurality of points defining the image of the printing screen, whether the point is of aperture, and, where the point is of aperture, determine whether the corresponding point of the corresponding image of the workpiece, as defined by a corresponding plurality of points, is of deposit, thereby enabling a determination of a print characteristic of deposits printed on the workpiece from a relationship of the points determined to be of deposit to the points determined to be of aperture.
2. The system of claim 1, wherein the camera unit is operable simultaneously to capture images the printing screen and the workpiece.
3. The system of claim 1 or 2, wherein the camera unit is a full-area camera unit for capturing full-area images of the printing screen and the workpiece.
4. The system of claim 1 or 2, wherein the camera unit is a line-scan camera unit for capturing line-scan images of the printing screen and the workpiece.
5. The system of any of claims 1 to 4, wherein the control unit is configured simultaneously to process the images of the printing screen and the workpiece during image capture by the camera unit.

6. The system of any of claims 1 to 4, wherein the control unit is configured to process the captured images subsequent to acquisition.
7. The system of any of claims 1 to 6, wherein the images of the printing screen and the workpiece are defined by respective ones of screen and workpiece signals having intensities in dependence upon the imaged features, with the points defining each of the images being time-sliced components of the respective screen and workpiece signals.
8. The system of claim 7, wherein the relationship of the points determined to be of deposit to the points determined to be of aperture is determined from a time count of a time for which the workpiece signal is determined to be of deposit relative to a time for which the screen signal is determined to be of aperture.
9. The system of any of claims 1 to 6, wherein the images of the printing screen and the workpiece are pixelated images, with the points defining each of the images being pixels of the pixelated images.
10. The system of claim 9, wherein the relationship of the points determined to be of deposit to the points determined to be of aperture is determined from a number count of the number of pixels determined to be of deposit relative to the number of pixels determined to be of aperture.
11. The system of claim 9 or 10, wherein the control unit is configured to acquire a plurality of pairs of corresponding images of the printing screen and the workpiece in accordance with an inspection schedule defining a plurality of inspection sites at which images are in use acquired.

12. The system of claim 11, wherein the inspection sites of the inspection schedule are determined in a set-up routine.
13. The system of claim 12, wherein an offset in the corresponding pair of images of the printing screen and the workpiece as acquired by the camera unit at each inspection site is predetermined, such that the pixel in an image of the workpiece corresponding to a pixel in the corresponding image of the printing screen is determined in accordance with the offset.
14. The system of any of claims 1 to 13, wherein the print characteristic comprises a representation of a percentage of a determined deposit coverage as compared to an expected deposit coverage.
15. The system of claim 14, wherein the print characteristic is provided as a representation for all deposits.
16. The system of claim 15, wherein the representation is of a worst case deposit.
17. The system of claim 14 when appendant upon any of claims 11 to 13, wherein the print characteristic is provided as a plurality of representations for the inspection sites.
18. The system of claim 17, wherein the representation for each inspection site is of a worst case deposit in the respective inspection site.
19. The system of claim 17, wherein the representation for each inspection site comprises a plurality of representations corresponding to at least ones or groups of ones of the deposits in the respective inspection site.

20. The system of any of claims 1 to 19, wherein the points determined to be of deposit are determined by reference to a reference threshold value of image intensity.
21. The system of claim 20, wherein, for at least one of the apertures, the points determined to be of deposit are determined as having an image intensity one of above or below a reference threshold value of image intensity.
22. The system of claim 20 or 21, wherein, for at least one of the apertures, the points determined to be of deposit are determined as having an image intensity within upper and lower bounding limits of a reference threshold value of image intensity.
23. A screen printing machine incorporating the inspection system of any of claims 1 to 22.
24. A method of inspecting deposits printed on workpieces through a printing screen, the method comprising the steps of:
capturing images of at least one pair of corresponding regions of a printing screen, where comprising a body including a plurality of apertures, and a workpiece on which deposits are printed through the apertures of the printing screen; and
processing the images to determine, for each of a plurality of points defining the image of the printing screen, whether the point is of aperture, and, where the point is of aperture, determine whether the corresponding point of the corresponding image of the workpiece, as defined by a corresponding plurality of points, is of deposit, thereby enabling a determination of a print characteristic of deposits printed on the workpiece from a relationship of the points determined to be of deposit to the points determined to be of aperture.
25. The method of claim 24, wherein the images of the printing screen and the workpiece are captured simultaneously.

26. The method of claim 24 or 25, wherein full-area images are captured of the printing screen and the workpiece.
27. The method of claim 24 or 25, wherein line-scan images are captured of the printing screen and the workpiece.
28. The method of any of claims 24 to 27, wherein the image capture and processing steps are performed simultaneously.
29. The method of any of claims 24 to 27, wherein the processing step is performed subsequent to the image capture step.
30. The method of any of claims 24 to 29, wherein the images of the printing screen and the workpiece are defined by respective ones of screen and workpiece signals having intensities in dependence upon the imaged features, with the points defining each of the images being time-sliced components of the respective screen and workpiece signals.
31. The method of claim 30, wherein the relationship of the points determined to be of deposit to the points determined to be of aperture is determined from a time count of a time for which the workpiece signal is determined to be of deposit relative to a time for which the screen signal is determined to be of aperture.
32. The method of any of claims 24 to 29, wherein the images of the printing screen and the workpiece are pixelated images, with the points defining each of the images being pixels of the pixelated images.
33. The method of claim 32, wherein the relationship of the points determined to be of deposit to the points determined to be of aperture is determined from a number count of the number of pixels

determined to be of deposit relative to the number of pixels determined to be of aperture.

34. The method of claim 32 or 33, wherein, in the image capture step, a plurality of pairs of corresponding images of the printing screen and the workpiece are acquired at a plurality of inspection sites in accordance with an inspection schedule.
35. The method of claim 34, further comprising the step of:
performing a set-up routine to determine an inspection schedule defining a plurality of inspection sites at which images are to be acquired.
36. The method of claim 35, wherein, in the set-up routine, an offset in the corresponding pair of images of the printing screen and the workpiece at each inspection site is determined, and, in determining the pixel in an image of the workpiece corresponding to a pixel in the corresponding image of the printing screen, the pixel in the image of the workpiece corresponding to the pixel in the corresponding image of the printing screen is determined in accordance with the offset.
37. The method of any of claims 24 to 36, wherein the print characteristic comprises a representation of a percentage of a determined deposit coverage as compared to an expected deposit coverage.
38. The method of claim 37, wherein the print characteristic is provided as a representation for all deposits.
39. The method of claim 38, wherein the representation is of a worst case deposit.
40. The method of claim 37 when appendant upon any of claims 34 to 36, wherein the print characteristic is provided as a plurality of representations for the inspection sites.

41. The method of claim 40, wherein the representation for each inspection site is of a worst case deposit in the respective inspection site.
42. The method of claim 40, wherein the representation for each inspection site comprises a plurality of representations corresponding to at least ones or groups of ones of the deposits in the respective inspection site.
43. The method of any of claims 24 to 42, wherein each corresponding point of the corresponding image of the workpiece is determined to be of deposit by reference to a reference threshold value of image intensity.
44. The method of claim 43, wherein, for at least one of the apertures, each corresponding point of the corresponding image of the workpiece is determined to be of deposit in having an image intensity one of above or below a reference threshold value of image intensity.
45. The method of claim 43 or 44, wherein, for at least one of the apertures, each corresponding point of the corresponding image of the workpiece is determined to be of deposit in having an image intensity within upper and lower bounding limits of a reference threshold value of image intensity.